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Agent	Sang-Hun Heo
Inventor	Byeong-Man Jeong
Applicant	HYUNDAI MOTOR COMPANY
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Title of Invention	Heating apparatus for bus



### Abstract

The invention relates to for bus heating apparatus, providing for bus heating apparatus which is the ventilation fan having this heater core front side is the fixed length the heater core comprised according to the longitudinal direction in a long queue is built within the heater duct full section installed at the vehicle room bottom either side in car body backward and forward in a long queue in line placement as the some extent thing, and the inhaled on the heater duct from the inlet which forms air is guided according to the guide portion after the air passing through the heater core and being heated and ejected on the heater duct through the outlet which forms to the vehicle room.

According to the present invention, it has the effect that in the heater duct entire region, the warmth heated through the heater core of inside is discharged. In that way the temperature distribution of the vehicle room in which heating is made is uniform. In conclusion, the heating efficiency can be improved. Moreover, it has the effect that the heater core is located within the heater duct. In that way volume is not kicked with indoor or the floor bottom side. The trunk capacity ratio of the floor bottom side and indoor capacity ratio can be made enlarged.



### Representative Drawing(s)

Fig. 1



### Keyword(s)

The bus, heating apparatus, heater duct, heater core, ventilation fan, controller.



## Description

### ■ Brief Explanation of the Drawing(s)

Figure 1 is a plane view showing the installation state of for bus heating apparatus according to the invention

Figure 2 is 'A-A' cross-sectional view of fig. 1

Figure 3 is a notch prospect diagram showing the ventilation fan according to the invention

The plane view which the drawing 4a , and 4b and 4c show the installation state of the conventional for bus heating apparatus.

The description • of the denotation about the main part of • drawing.

1: bus 10: engine.

22: heater pipe 24: heater core.

25: on off valve 26: heater duct.

28: inlet 29: outlet.

30: ventilation fan 40: guide portion.

50: controller.

### ■ Details of the invention

#### ■ Purpose of the invention

##### ■ The Technical Field to which the invention belongs and the Prior Art in that Field

The invention relates to for bus heating apparatus, more specifically, to for bus heating apparatus which is the ventilation fan having this heater core front side is the fixed length the heater core comprised according to the longitudinal direction in a long queue is built within the heater duct full section installed at the vehicle room bottom either side in car body backward and forward in a long queue in line placement as the some extent thing, and the inhaled on the heater duct from the inlet which forms air is guided according to the guide portion after the air passing through the heater core and being heated and ejected on the heater duct through the outlet which forms to the vehicle room.

Generally, as for bus heating apparatus is the embodiment, the several discrete heater units (14) is evenly arranged to the bus (1) indoor attached and it sets up. The indoor air is directly heated up through each discrete heater unit (14), or it is another preferred embodiment. The air heated up through each discrete heater unit (14) attached is discharged to the fixed position of indoor through the heater duct (16) and heating is comprised.

Here, the discrete heater unit (14) assembles the heater core and the ventilation fan which is not illustrated. The heater pipe (12) connected in the heater core to the automotive engine (10) is connected. And the heater

core sets up the tube (non illustration), passing the heated cooling water which is supplied from the engine (10) through the heater pipe (12) through and tube and the heat radiation fin which it does not show between tube.

Here, it is installed at the vehicle room bottom either side in car body backward and forward in a long queue and the heater duct (16) is the warmth path in which the heated air flows away through the heater unit (14). The warmth of inside is discharged as the vehicle room through the outlet (18) of the sheet (not illustrated) bottom side.

But there is a problem that the indoor temperature distribution is bad relatively the mode (Figure 4a) which directly heats up the indoor air without the heater duct installation through the discrete heater unit the mounted part of the heater unit is hot and relatively the besides is cold. The noise of the heater unit is delivered to the vehicle room.

Moreover, the mode (4b) discharging the warmth through the heater duct was advantageous to compare to the mode in which heating was made without the heater duct installation and uniformly the indoor temperature distribution. But the big difference was generated in the location discharging rate of each outlet and the indoor temperature distribution was uniformly but the difference had limit.

In another preferred embodiment, two large size heater units (14) is set up in the floor bottom side attached in right and left side of a car body. After the air which here is heated is transmitted to the heater duct (16) inside through the ventilation fan (it is not shown), it discharges to the indoor fixed position through each outlet (18) and heating is comprised.

But since the big difference existed in a , moreover, the location discharging rate of outlet, the indoor temperature distribution was uniformly but the difference had limit.

Moreover, there is a problem that modes occupy the indoor volume and floor bottom side volume since the heater core has to be installed separately from the heater duct.

#### • The Technical Challenges of the Invention

Therefore, it are an object of the present invention to provide for bus heating apparatus which to solve problems described in the above, invents, and the air heated through the heater duct entire region is discharged, and in that way the temperature distribution of the vehicle room in which heating is made can be uniform, and in conclusion, the heating efficiency can be improved, and the heater core is located within the heater duct, and in that way can not kick volume with indoor or the floor bottom side, and make the trunk capacity ratio of the floor bottom side and indoor capacity ratio enlarged.

#### ■ Structure & Operation of the Invention

Hereinafter, if the invention attached is illustrated, it is the same as that of the next time.

The present invention to achieve above object: it is ventilation fan (30) having this heater core (24) front side is the fixed length the heater core (24) comprised according to the longitudinal direction in a long queue is built within the heater duct (26) full section installed at the bus vehicle (1) indoor bottom either side in car body backward and forward in a long queue in line placement as the some extent thing. After the air inhaled on the heater duct (26) from the inlet (28) formed passing through the heater core (24) and being heated, the air is guided according to the guide portion (40) and it characterizes to be ejected on the heater duct (26) through the outlet (29) formed to the vehicles (1) indoor.

In a desirable preferred embodiment of the present invention, the inlet (28) and outlet (29) characterize to form according to the heater duct (26) in a long queue.

Moreover, the inlet (28) is formed in the heater duct (26) upper side. The outlet (29) characterizes to be formed in the heater duct (26) side.

Moreover, each ventilation fan (30) characterizes to be the shape of impeller in which it becomes a plurality of blades (34) formed in a specific direction with the central axis (32) into one body.

Moreover, the number of rotation is controlled with the predetermined signal outputted from the controller (50) so that amount of the warmth discharged to the vehicles (1) indoor each ventilation fan (30) be controlled. It characterizes that the number of rotation of each ventilation fan (30) is identical, the number of rotation is controlled.

Moreover, in the cooling water inflow opening part of the heater core (24), on off valve (25) operating according to the predetermined signal outputted from the controller (50) is installed. It characterizes that the controller (50) automatically operates on off valve (25) with lungs if the ventilation fan (30) is turned off.

Moreover, it is formed in a long queue and the guide portion (40) is comprised of two guide plates (42,44) installed in the ventilation fan (30) upper and bottom side according to the longitudinal direction. And entrance is opened to the heater core (24) front side and exit characterizes to be opened to the outlet (29).

Hereinafter, if described in more detail, it is the invention attached the same like next.

It attaches. And figure 1 is fig. 2 is 'A-A' cross-sectional view of fig. 1 it is the plane view showing the installation state of for bus heating apparatus according to the invention.

As shown in the above, in the heating apparatus of the present invention, long, the heater duct (26) is set up in the vehicles (1) indoor bottom either side in car body backward and forward. The heater core (24) is built within this heater duct (26).

It is comprised in a long queue and the heater core (24) is installed in the heater duct (26) full section according to the longitudinal direction. The tube (non illustration), in which the heated cooling water which is supplied from the engine (10) through the heater pipe (22) passes and this tube and the heat radiation fin which it does not show between tube are assembled into one body. And the heat transmitted from the tube warm water resistance effectively heats up the passing air through the heat radiation fin.

Moreover, the inlet (28) and the outlet (29) formed in a long queue are equipped on the heater duct (26) according to the longitudinal direction. And the inlet (28) forms in the heater duct (26) upper side. The outlet (29) forms in the heater duct (26) side.

If the indoor air of the vehicles (1) passes through the inlet (28) and the indoor air is flowed in within the heater duct (26), the heater core (24) in which the heat exchange is made is passed through. It passes through the outlet (29) and the warmth passing through this heater core (24) is discharged to the vehicles (1) indoor.

The heater core (24) front side, the ventilation fan (30) of the fixed length is installed. And a plurality of ventilation fans (30) is arranged to one line to as to the ventilation fan (30) of the present invention, in the form of the impeller in which it becomes a plurality of blades (34) formed in a specific direction with the central axis (32) into one body in the heater core (24) front side.

Moreover, in order that the air passing through the heater core (24) with the suction force of the ventilation fan (30) is smoothly guided to the outlet (29), it is formed in a long queue and the guide portion (40) consisting of two guide plates (42,44) installed in the ventilation fan (30) upper and bottom side according to the longitudinal direction is installed.

Here, it is natural that the guide portion (40) upper entrance formed into the combination of the bottom side guide plate (44) and upper (42) is opened to the heater core (24) front side. The guide portion (40) bottom side exit has to be opened to the outlet (29).

In this way, the inhaled by the suction force of each ventilation fan (30) from the inlet (28) of the heater duct (26) air passes through the heater core (24) and the air is exhausted to the ventilation fan (30) neighboring according to the installed guide portion (40) through the outlet (29) of the heater duct (26).

In conclusion, in the heater duct (26) entire region, the warmth passing through the heater core (24) which is built in according to this in a long queue and is heated is ejected to the vehicles (1) indoor. In that way the temperature distribution of the vehicles (1) indoor in which heating is made is uniform.

Moreover, in a desirable preferred embodiment of the present invention, each ventilation fan (30) is identically controlled with the predetermined operation signal outputted from the controller (50).

That is, if the predetermined signal is inputted to the controller (50) so that operator control the indoor temperature of the vehicles (1), the controller (50) controls the number of rotation of each ventilation fan (30) and amount of the warmth discharged to the vehicles (1) indoor is controlled. The number of rotation of each ventilation fan (30) is identically controlled for the uniform indoor temperature.

Here, the existing heater controller (50) which operator manipulates without the separate installation for the indoor temperature control of the vehicles (1) can become the controller (50).

Moreover, in the invention, on off valve (25) operating according to the predetermined signal outputted in the cooling water inflow opening part of the heater core (24) in which the cooling water heated in the engine (10) is flowed in from the controller (50) is set up.

The ventilation fan (30) is turned off for the case which does not use the heating apparatus like the summer season etc. and the controller (50) automatically operates on off valve (25) with the lungs. The cooling water therefore flowed in into the heater core (24) is utterly cut off and it prevents that the heat exchange is comprised of the heater core (24).

#### ■ Effects of the Invention

As illustrated in the above, it has the effect that according to for bus heating apparatus according to the invention, the air heated through the heater duct entire region is discharged. In that way the temperature distribution of the vehicle room in which heating is made is uniform. In conclusion, the heating efficiency can be improved.

Moreover, it has the effect that the heater core is located within the heater duct. In that way volume is not kicked with indoor or the floor bottom side. The trunk capacity ratio of the floor bottom side and indoor capacity ratio can be made enlarged.



#### Scope of Claims

##### Claim 1 :

For bus heating apparatus, wherein this heater core (24) front side the heater core (24) comprised according to the longitudinal direction in a long queue is built within the heater duct (26) full section installed at the vehicles (1) indoor bottom either side in car body backward and forward in a long queue is the ventilation fan (30) having the fixed length in line placement as the some extent thing; and the inhaled on the heater duct (26) from the inlet (28) formed air is guided according to the guide portion (40) after the air passing through the heater

core (24) and being heated and the air is ejected on the heater duct (26) through the outlet (29) formed to the vehicles (1) indoor.

Claim 2 :

For bus heating apparatus of claim 1, wherein the inlet (28) and outlet (29) characterize to form according to the heater duct (26) in a long queue.

Claim 3 :

For bus heating apparatus of claim 2, wherein the inlet (28) is formed in the heater duct (26) upper side; and the outlet (29) is formed in the heater duct (26) side.

Claim 4 :

Feature for bus heating apparatus the thing which is the a plurality of blades (34) into one body with the central axis (32) shape of impeller of claim 1, wherein each ventilation fan (30) forms in a specific direction.

Claim 5 :

For bus heating apparatus of claim 1, wherein the number of rotation is controlled with the predetermined signal outputted from controller so that amount of the warmth discharged to the vehicles (1) indoor be controled; and the number of rotation of each ventilation fan (30) is identical, it is controlled.

Claim 6 :

For bus heating apparatus of claim 1 or 5, wherein in the cooling water inflow opening part of the heater core (24), on off valve (25) operating according to the predetermined signal outputted from the controller (50) is installed; and the controller (50) automatically operates on off valve (25) with the lungs if the ventilation fan (30) is turned off.

Claim 7 :

For bus heating apparatus of claim 1, wherein the guide portion (40) is formed in a long queue and it is comprised of two guide plates (42,44) installed in the ventilation fan (30) upper and bottom side according to the longitudinal direction; and entrance is opened to the heater core (24) front side and exit is opened to the outlet (29).



Drawings

Fig. 1

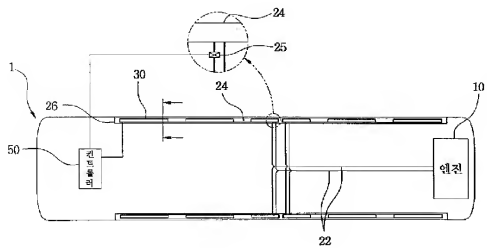


Fig. 2

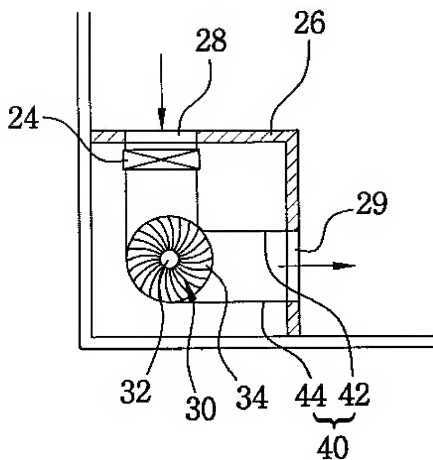


Fig. 3



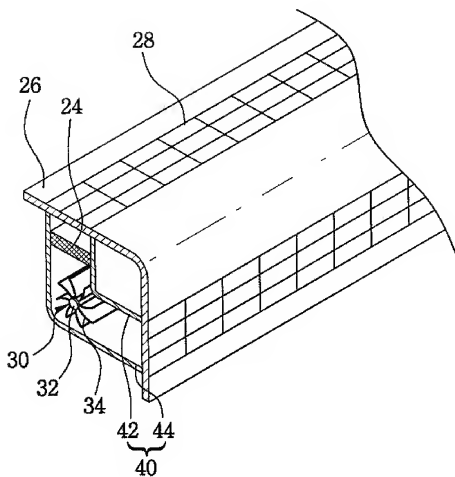


Fig. 4a

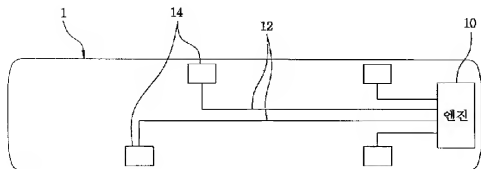


Fig. 4b

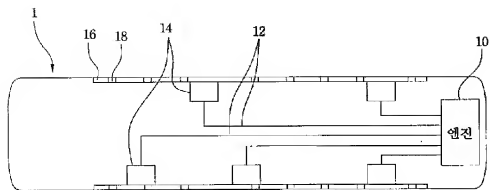


Fig. 4c

